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For, so far from finding that the time of "mid-velocity" follows the time of light-minimum by a very short interval, Dr. Schlesinger * finds the observations of Belopolsky, Curtiss, and himself to agree at least in this, that the minimum phase lags an hour or two behind the time demanded by the velocity determinations. This suggests that the influence of tidal and rotational forces is operating to modify the figures of the stars; at any rate, the effect we have to seek is evidently masked by disturbing causes, such as have been suggested by Professor Lebedew † in a recent article.

The eccentricity of the orbit has been neglected. But in any case the star B has its mid-velocity (which must not be confused with the mean velocity, or velocity of the system) when it comes to B_0 where B_0 G is perpendicular to the line of nodes B D. Hence neither eccentricity nor inclination will affect the qualitative result and allowance for the effects of these factors will be made with sufficient accuracy by interpreting *b* and *d* as the projections on the plane containing the line of sight and the line of nodes of the actual radii vectores at B_0 and D_0. For the mean motion *n* must also be substituted the actual angular motion about G at the same points.

Note on Mr. W. S. Franks' Analysis of the Colours and Magnitudes of 3630 *Stars* (*M.N.*, lxix. p. 106). By Julia Bell, M.A.

(*Communicated by Professor Karl Pearson, F.R.S.*)

Mr. Franks' tables admit at once of treatment by the method of contingency. We have the following results: if C_2 be the coefficient of mean square contingency,

Combined galactic regions,	$C_2 = \cdot 22$
Combined non-galactic regions,	$C_2 = \cdot 18$
Total stars of both series,	$C_2 = \cdot 19$

It would appear that the relation between luminosity and colour is slightly more intense in the galactic regions.

Previous values for the contingency of magnitude and colour (Gibson and Pearson, *Monthly Notices*, lxviii. p. 419) are $C_2 = \cdot 30$ and ·27. These values are distinctly higher, but it may be noted that they were for *photographic* magnitudes, while Mr. Franks' results are for *visual* magnitudes, and contain no blue or green stars.

The percentages values of the different colours in the two groups are compared with those of stars in general by Mr. Franks on p. 107. It is interesting to note the probability that the galactic or the non-galactic stars are a "random sample" from stars in general. Applying the usual method for "goodness of fit"

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* *Publ. Allegheny Obs.*, i., No. 5. † *Astrophys. J.*, xxix. p. 101.

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(Pearson, *Phil. Mag.*, 2, p. 157, "on the criterion that a given system of deviations from the probable . . . . is such that it can be reasonably supposed to have arisen from random sampling"), we learn that only once in 500 samples would there arise a group so divergent as the stars of the galactic region from stars as a whole, and only once in 2500 samples would there arise a group so divergent as the non-galactic stars from stars as a whole. It is therefore unlikely that these groups are random samples. But the differentiation is not as great as one frequently finds in investigations of this kind. The two groups of stars are significantly different, but the difference* is not of that sweeping character which occurs, say, in the deviations between theory and observation in the colour runs of some roulette tables, where the differentiation is such that not one sample in 10^9 trials would deviate as much as observation does. It seemed worth while to reduce Mr. Franks' data to an estimate of this kind, because, while some stress must be laid on the colour differentiation between galactic and non-galactic stars, it is still not one of the kind which produces a sweeping conviction that it is of fundamental importance.

On the Orbit of Jupiter's Eighth Satellite. By P. H. Cowell, M.A., F.R.S., A. C. D. Crommelin, B.A., and C. Davidson. (Plate 16.)

In the *Monthly Notices* of last June an orbit was given for Jupiter's Eighth Satellite based upon the observations made within three months. Having been given the observed right ascensions and declinations, the problem was to deduce the geocentric distance and the motion in the line of sight. This was done with sufficient accuracy to assign the satellite's position for the next opposition to within four minutes of arc. Nevertheless, the error of geocentric distance was of such a magnitude that, if placed transverse to the line of sight, it would have subtended about one minute of arc. For an accurate orbit such an error is inadmissible; and hence it follows that the observations at any one opposition can only be considered as giving rise to four equations of condition, viz. observed right ascension and declination, and observed motion in these coordinates. The material at our disposal now amounts to eight observed quantities, viz. the above four at the oppositions of 1908 and 1909. When the conditions of the problem are assumed, there are only six arbitrary constants in the motion. An orbit, however, that satisfies the observed right ascension and declination in 1908 February, 1908 March, and 1909 January will be sure to satisfy the observed place in 1909 February, unless the

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* It does not exceed the divergence given by ordinary dice, which are usually loaded, though not intentionally.

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